

## Claims

### What is claimed is:

- 5    1. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain comprising the steps of:  
modulating each bit-stream of the plurality of different bit-streams on a plurality of OFDM sub-carriers;  
converting each modulated bit stream on a plurality of parallel OFDM sub-carriers in frequency domain; and,  
frequency interleaving the parallel OFDM sub-carriers of each bit-stream with the parallel OFDM sub-carriers of the other bit streams of the plurality of different bit streams such that the parallel OFDM sub-carriers of each bit-stream are spread over an entire available frequency spectrum.
- 15    2. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 1, wherein the sub-carriers of different bit streams have different spectral efficiency.
- 20    3. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 2, wherein the sub-carriers of the different bit streams are alternated in a predetermined fashion.
- 25    4. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 3, wherein the available frequency spectrum is equally divided between the different bit streams resulting in a substantially equal number of sub-carriers for each bit stream.
- 30    5. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 3, wherein the available frequency spectrum is

unequally divided between the different bit streams resulting in a different number of sub-carriers for different bit streams.

6. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 3, wherein the predetermined fashion is time varying.

7. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 2, wherein the sub-carriers are interleaved statistically using a pseudo-random sequence.

8. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 7, wherein the pseudo-random sequence is time varying.

15 9. A method for tiered digital broadcasting comprising the steps of:  
receiving a plurality of different bit streams, wherein each bit stream represents digital data targeted for a different service;

modulating each bit-stream of the plurality of different bit-streams on a plurality  
20 of OFDM sub-carriers, wherein the sub-carriers of different bit streams have different spectral efficiency;

converting each modulated bit stream on a plurality of parallel OFDM sub-carriers in frequency domain;

frequency interleaving the parallel OFDM sub-carriers of each bit-stream with the  
25 parallel OFDM sub-carriers of the other bit streams of the plurality of different bit streams such that the parallel OFDM sub-carriers of each bit-stream are spread over an entire available frequency spectrum;

transforming the interleaved sub-carriers into time domain for providing a frequency interleaved OFDM signal;

30 upconverting the frequency interleaved OFDM signal to the frequency of a broadcasting channel: and,

transmitting the upconverted signal.

10. A method for tiered digital broadcasting as defined in claim 9, wherein the step of modulating each bit-stream comprises coding based on a Forward Error Correction code.

5

11. A method for tiered digital broadcasting as defined in claim 9, wherein the interleaved sub-carriers are transformed into time domain using IFFT.

10 12. A method for interleaving sub-carriers of a plurality of different bit streams in frequency domain as defined in claim 11, wherein the sub-carriers of different bit streams have different spectral efficiency.

15 13. A method for tiered digital broadcasting as defined in claim 12, wherein the available frequency spectrum comprises the entire spectrum of a RF channel.

14. A method for tiered digital broadcasting as defined in claim 12, wherein the available frequency spectrum comprises a portion of the spectrum of a RF channel.

20 15. A method for tiered digital broadcasting as defined in claim 14, wherein the OFDM signal is combined with an analog TV signal.

16. A method for tiered digital broadcasting as defined in claim 11, comprising the steps of:

25 receiving the transmitted OFDM signal;

transforming the received OFDM signal into frequency domain using FFT;

de-packaging the transformed OFDM signal in order to conjoin the sub-carriers belonging to each different bit stream; and,

30 decoding at least one bit stream and providing digital data in dependence thereupon.

17. A method for tiered digital broadcasting as defined in claim 16, comprising the step of downconverting the received OFDM signal.

18. A method for tiered digital broadcasting as defined in claim 17, comprising the 5 step of A/D converting the OFDM signal.

19. A method for tiered digital broadcasting as defined in claim 18, comprising the step of low-pass filtering the OFDM signal.

10 20. A system for tiered digital broadcasting comprising:  
a port for receiving a plurality of different bit streams, wherein each bit stream  
represents digital data targeted for a different service;  
a processor for modulating each bit-stream of a plurality of different bit-streams  
on a plurality of parallel OFDM sub-carriers, for frequency interleaving the parallel  
15 OFDM sub-carriers of each bit-stream with the parallel OFDM sub-carriers of the other  
bit streams of the plurality of different bit streams such that the parallel OFDM sub-  
carriers of each bit-stream are spread over an entire available frequency spectrum and for  
transforming the interleaved sub-carriers into time domain providing a frequency  
interleaved OFDM signal;  
20 a D/A converter for converting the frequency interleaved OFDM signal; and,  
a RF upconverter for upconverting the signal to a broadcaster's RF frequency for  
transmission.

21. A system for tiered digital broadcasting as defined in claim 20, comprising:  
25 a second other port for receiving the transmitted OFDM signal;  
a tuner for downconverting the received OFDM signal;  
an A/D converter for converting the OFDM signal; and,  
a processor for low pass filtering the OFDM signal, for transforming the OFDM  
signal into frequency domain using FFT, for de-packaging the transformed OFDM signal  
30 in order to conjoin the sub-carriers belonging to each different bit stream, and for  
decoding at least one bit stream and providing digital data in dependence thereupon.